



# *Integrating Social Tagging and Document Annotation for Content Based Search in Multimedia Data*

Harald Sack  
Jörg Waitelonis  
Friedrich-Schiller-Universität Jena  
Germany

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**Athens, GA, USA, November 6th 2006**



# Integrating Social Tagging and Document Annotation for Content Based Search in Multimedia Data

## • Searching Multimedia

- keyword based search
- keyword generation
  - manual
  - automatic
- keywords provided by
  - resource author
  - expert
  - non-expert (all others)



**collaborative tagging**





# Integrating Social Tagging and Document Annotation for Content Based Search in Multimedia Data

- **Searching Multimedia**

- keyword stands for entire resource



- but, what if you are only interested in a small part of the resource ?



e.g. recorded lecture

- duration ~90 minutes
- interesting parts ~5 minutes

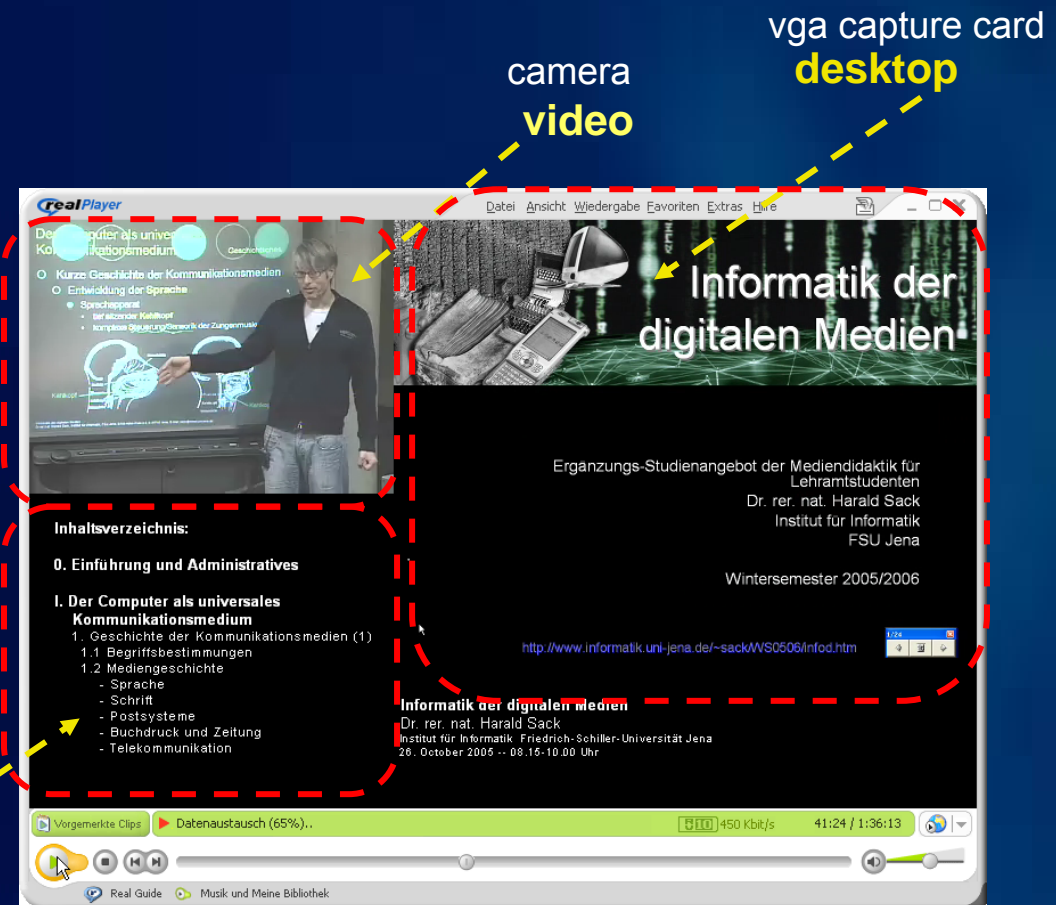


# Integrating Social Tagging and Document Annotation for Content Based Search in Multimedia Data

## ● Lecture Recording

### ○ Media-Streaming

- synchronized video and desktop recording with navigation
- encoded with SMIL or MPEG 4



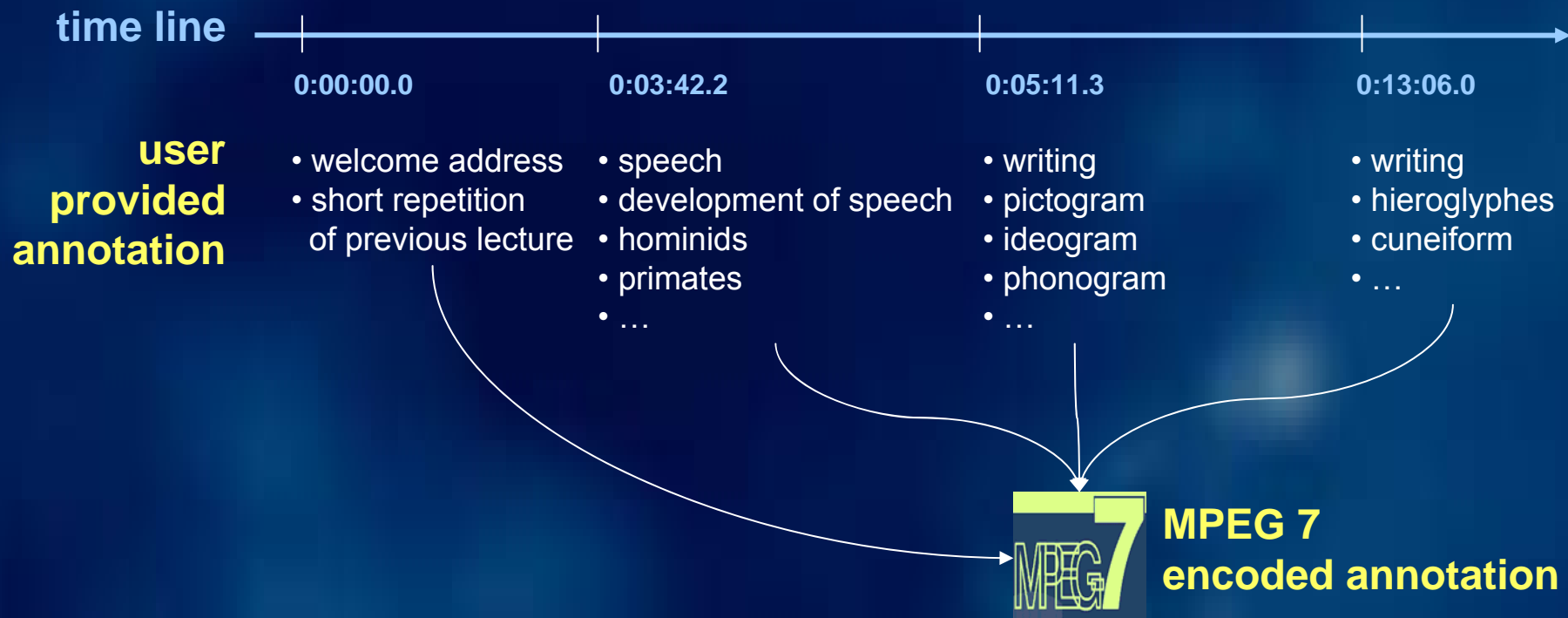
interactive  
table of contents  
(post processing)

SMIL/MPEG4 encoding



# Integrating Social Tagging and Document Annotation for Content Based Search in Multimedia Data

## • Manual Annotation of Recorded Lectures





# Integrating Social Tagging and Document Annotation for Content Based Search in Multimedia Data

## • Automatic Annotation of Recorded Lectures

- use all available resources:
  - video recording, desktop recording, **presentation slides**, audio recording, ...

desktop  
presentation

time line

annotation  
generated  
from  
desktop  
presentation



0:00:00.0

- lecture title
- author name
- ...



0:03:42.2

- speech
- development of speech
- hominids
- primates
- ...



0:05:11.3

- writing
- pictogram
- ideogram
- phonogram
- ...



0:13:06.0

- writing
- hieroglyphes
- cuneiform
- ...





# Integrating Social Tagging and Document Annotation for Content Based Search in Multimedia Data

## • Automatic Annotation of Recorded Lectures

- from presentation to annotation

**Der Computer als universales Kommunikationsmedium** Geschichtliches

- Kurze Geschichte der Kommunikationsmedien
- Entwicklung der **Sprache**
  - Sprechapparat
    - tief sitzender **Kehlkopf**
    - komplexe Steuerung/Sensorik der Zungenmuskulatur

Informations- und Medien-  
Grafik, Harald Sack, Institut für Informatik, FSU Jena, Ernst-Abbe-Platz 2-4, D-07743 Jena, E-Mail: sack@informatik.fsu.de

**MPEG7**  
**Scene Description**



```
<!xml version="1.0" encoding="iso-8859-1">
<Mpeg7 xmlns=urn:mpeg:mpeg7:schema:2001 ...>
...
<AudioVisualSegment>
  <TextAnnotation type="heading" xml:lang="de">
    <FreeTextAnnotation> The Computer as Universal
                          Communication Medium
    </FreeTextAnnotation>
  </TextAnnotation>
  ...
  <MediaTime>
    <MediaTimePoint> T00:03:42.2 </MediaTimePoint>
    <MediaDuration> PT1M28.6S </MediaDuration>
  </MediaTime>
  ...
</AudioVisualSegment>
```



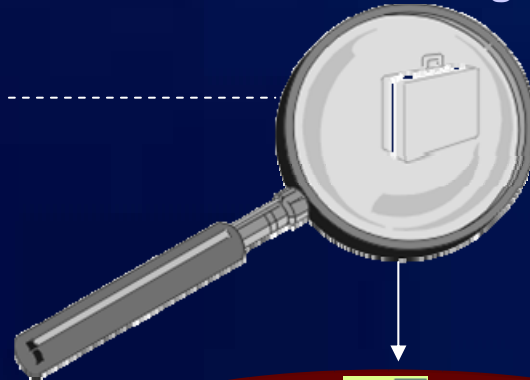
# Integrating Social Tagging and Document Annotation for Content Based Search in Multimedia Data

- **Searching Multimedia Lectures**
  - **Keywords generated from content**

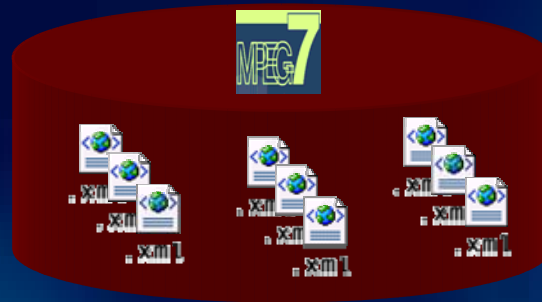
Query String  
z.B. **“hieroglyphs”**



Search Engine



MPEG 7  
Database



Results



Media Server

Sack, Waitelonis, MTG 2006

Harald Sack, Jörg Waitelonis, Institut für Informatik, FSU Jena, D-07743 Jena, Germany





# *Integrating Social Tagging and Document Annotation for Content Based Search in Multimedia Data*

## ● **Collaborative Annotation of Video Segments**

### ○ **Prerequisites**

- keep user interface as simple as possible (!)

### ○ **Annotation of entire resource**

- similar as existing social tagging systems

### ○ **Annotation of partial resources**

- one-button solution: pressing button during replay marks **predefined video segment** that can be tagged
- predefined segmentation:
  - each **slide** defines a new video segment (fine)
  - if available, use **table of contents** for segment definition



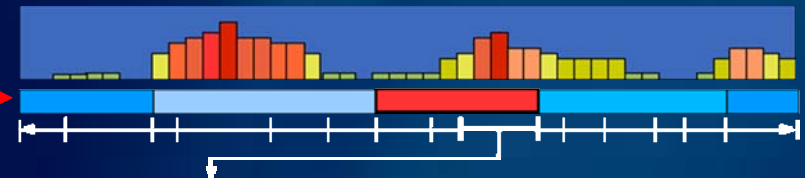
# Integrating Social Tagging and Document Annotation for Content Based Search in Multimedia Data

## • Collaborative Lecture Annotation

### ○ Annotation of partial resources

- video segmentation:
  - each **slide** defines a new video segment (fine grain segmentation)
  - if available, use **table of contents** for segment definition

The screenshot shows a video player interface. The main video frame displays a lecture slide titled "5. Suchmaschinen" with a sub-heading "5.2 Die Struktur des WWW". The slide content includes a bullet point: "Das WWW ist ein Graph" and a diagram of a "Hyperlink-Graph" with nodes A, B, and C. A red box highlights a table of contents on the left side of the slide, listing sections 6.1 through 6.3.1. Below the video frame, a red line indicates the segmentation of the video into segments defined by the table of contents.



The screenshot shows a lecture slide titled "5. Suchmaschinen" with a sub-heading "5.3 Wie funktioniert Google?". The slide content includes a bullet point: "Komponenten eines WebCrawlers (Vorschlag)" and a list of components: "Crawler", "Index", "Ranking", "Relevanz", "MetaTags", "Revisiting", "Robot", "Spider", "Webseiten", "WWW".

Aufbau Crawler Download  
Gewichtung GoogleBot Hypertext  
Hypertext Internet Links  
MetaTags Revisiting Robot  
Suchmaschinen Spider  
Webseiten WWW

*segments defined by TOC*

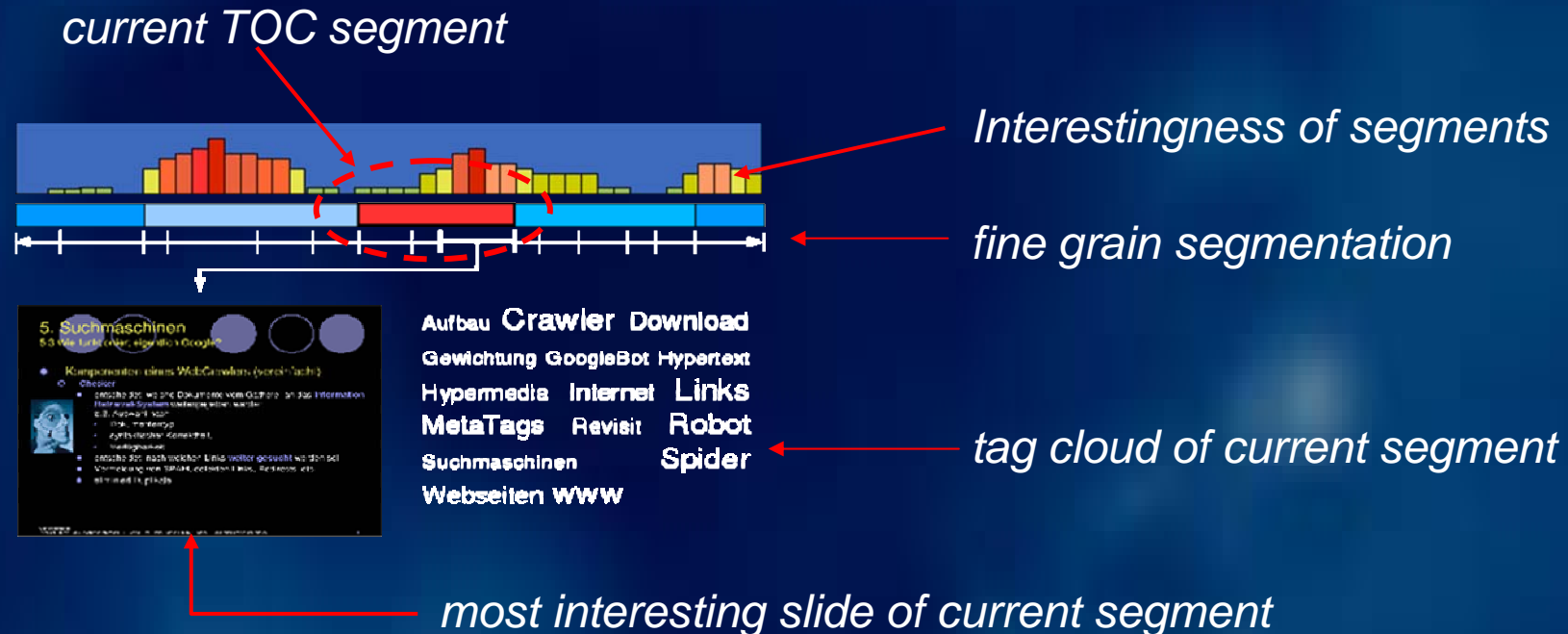


# Integrating Social Tagging and Document Annotation for Content Based Search in Multimedia Data

## • Collaborative Lecture Annotation

### ○ Annotation of partial resources

- video segmentation:
  - each **slide** defines a new video segment (fine grain segmentation)
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OSOTIS Search v02 - Mozilla Firefox

Datei Bearbeiten Ansicht Gehe Lesezeichen Extras Hilfe

Osotis

suchmaschinen Search

Webtechnologien SS 2006 2006-06-19  
5. Suchmaschinen Das 5. Suchmaschinen Das WWW ist ein Graph

base64 Google Hieroglyphen html Java  
LectureOnDemand Metasuchmaschine Podcast  
Prüfung Prüfungshinweis rdf  
SemanticWeb Seminar Stylesheets Web2.0  
Wichtig

new tag

**Inhaltsverzeichnis:**  
**6. WWW-Suchmaschinen**  
6.1 Suchmaschinentechologie  
6.2 WWW Struktur  
6.3 Wie funktioniert Google?  
6.3.1 Web Crawler

**5. Suchmaschinen**  
5.2 Die Struktur des WWW

- Das WWW ist ein Graph
  - Das WWW ist ein riesiger Graph, mit den **WWW-Dokumenten als Knoten** und den darin befindlichen **Hyperlinks als Kanten**

**Hyperlink-Graph**

**Vorlesung Webtechnologien**  
Dr. rer. nat. Harald Sack  
Institut für Informatik Friedrich-Schiller-Universität Jena  
19. Juni 2006 -- 10.15-11.45 Uhr

Tag Freq. Chapters Slides

**5. Suchmaschinen**  
5.2 Die Struktur des WWW

Aufbau Crawler Download  
Gewichtung GoogleBot Hypertext  
Hypermedia Internet Links  
MetaTags Revisit Robot  
Suchmaschinen Spider  
Webseiten WWW



# *Integrating Social Tagging and Document Annotation for Content Based Search in Multimedia Data*

- **Prototype available at**

`http://osotis-base1.inf-ra.uni-jena.de:8180/Osotis/`

# **Thank you for your attention!**